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July 12, 2017

ATTN: Joseph Laydon, Town Planner
Grafton Planning Board
Grafton Municipal Center
30 Providence Road
Grafton, MA 01519

RE: The Village at Institute Road
Response to Definitive Plan Review

Dear Planning Board Members:

This letter is in response to the comments submitted by Graves Engineering, Inc. (GEI) dated June 15, 2017. The GEI comments from their original 11/8/16 letter that needed additional responses as of the 6/15/17 comment letter are reiterated with Guerriere & Halnon, Inc's (G&H) responses following each comment. All other comments noted as "Acknowledged" do not need further response from G&H.

Subdivision Rules and Regulations

1. One waiver was requested. GEI reviewed the waiver request and the plans; we do not have technical concerns with the request to use low profile "Cape Cod" berm (§4.2.1.2) as long as vertical granite curb is used at the intersection radii and cul-de-sacs (as currently proposed) and as long as granite curb inlets are used at the catch basins (not currently proposed). We understand that the Planning board will address any waiver requests. If this waiver is to be granted, then the plan-view sheets will need to be revised to show granite curb at the catch basins, the catch basin construction detail will need to be revised to specifically require a granite curb inlet and the "Curb Transition Detail" on Sheet 26 will need to be revised to show a non-chamfered (aka "tip-down") transition curb instead of a chamfered transition.
   3/21/17: The plans were revised, but need to be further revised to be fully coordinated with the waiver requests. We don't have an issue with the waiver requests, the now propose a mix of bituminous Cape Cod berm, sloped granite edging (referred to on the plans as "sloped granite curb" and "sloped granite curbing") and vertical granite curb. The waiver requests ask for the use of Cape Cod berm at the Brooke Street cul-de-sac but Sheets 12 and 18 show a curbing line-type that is the same as vertical granite curbing at Dylan Way cul-de-sac shown on Sheet 14. As for transitions, "tip down" stones are required for transitions from vertical curb to Cape Cod Berm and chamfered stones are required for transitions from vertical curb to sloped granite edging. Sheet 29 of the plans only proposes one type of transition stone – a "tip down" but instead of transitioning to Cape Cod Berm, it proposes transitioning to sloped granite edging. The transition

stone detail needs to be revised and a second transition stone construction detail needs to be provided. Lastly, the "Catch Basin Detail" construction detail (sheet 30) must be revised to specifically require a granite curb inlet instead of vertical granite curbing.
6/15/17: No plan revisions were made to address this comment.

Response: The line-type on Sheets 12 & 18 have been revised; Sheet 29 has been revised in regard to transition type; Sheet 30 details have been revised.

2. Acknowledged.

3. Bounds were only proposed along the rights-of-way. The plans must be revised to also include bounds at all angle points along the easements, access routes and open space areas. (§3.3.3.10 & §3.3.3.17 & §4.8.1)
3/21/17: Although the design engineer responded that the plans were revised, no bounds are proposed at the easements or at the parcels (Parcels A, B and C). The plans need to be revised accordingly.
6/15/17: The plans were revised to propose bounds at the open space parcels and at most of the easements. Bounds were not shown at the snow easements on Lot 39 nor at the 44-foot wide drain easement on Lot 45, nor was an easement (with appropriate labeling) with bounds proposed for the sewer pump station off Westboro Road.

Response: Proposed bound locations have been added and an easement has been proposed for the sewer pump station off Westboro Road.

4. Acknowledged.

5. The words "Deeds of Easements to be Recorded Herewith" must be included on each plan sheet. (§3.3.3.15)
6/15/17: The words "Deeds of Easements to be Recorded Herewith" were added to Sheets 2-8. This language must be added to all plan sheets (including Sheets 1 and Sheets 9 to 32) unless directed otherwise by the Planning Department.

Response: Although only Sheets 2-8 will be recorded at the Registry of Deeds, the note "deeds of Easements to be Recorded Herewith" has been added to all other sheets.

6. Acknowledged.
7. Acknowledged.
8. Acknowledged.
9. Acknowledged.
10. Acknowledged.
11. Acknowledged.

12. The Engineer must provide pipe design flow calculations using the rational method for the 25-year storm event. (Rules and Regulations Governing the Subdivision of Land §3.3.3.19.d & Regulations Governing Stormwater Management §6.B.3.a)
3/21/17: The Engineer provided pipe design flow calculations for a portion of the drainage system (XC-DMH1 to XC-DMH3; DMH9 to DMH17; DMH18 to DMH17; DMH1 to DMH4; DMH4 to DMH5A; and DMH5A to DMH5). The Engineer must provide pipe design flow calculations for the entire proposed drainage system (CB1 through CB33; DMH6 to HWB1; DMH8 to DMH16;

the cross-country drainage system to the proposed stormwater management system behind Lot 16). Also, the submitted pipe design flow calculations show that the water velocity exceeds ten (10) feet per second (fps) at the four pipe segments between DI-2 and DMH3. This drainage system must be revised so that the water velocity in the pipes is between two (2) fps and ten (10) fps per Regulations Governing Stormwater Management §6.B.3.d. Finally, the submitted pipe design flow calculations for the pipe between DMH3 and DMH4 use an incorrect pipe size, the calculations must be revised to be consistent with the plans.
6/15/17: Revised Rational Method calculations were submitted. GEI reviewed the calculations and found them to be in order except as follows:

A. On the sheet labeled "Brook St. Bas. #1", none of the inlets into DMH9 (five inlets total) account for the flow from Dylan Way drainage system (1.09 acres of tributary area) and there are two inlets from CB18. The calculations need to be revised accordingly. With the additional flow from Dylan Way, there may or may not be adequate capacity in some of the pipes downstream of DMH9 (e.g. the pipes between: DMH9 and DMH10, DMH10 and DMH11, DMH13 and DMH14, DMH14 and DMH5, and DMH15 and DMH16).
B. On Sheet 30, the following information is not consistent with the calculations: labeled pipe slope (2%) between DMH16 and DMH17; labeled pipe slopes (2%, 4%) and lengths (135' and 20') between DMH17 and the discharge point into the basin; and the labeled pipe slope (2%), pipe diameter (36") and headwall invert elevation (371.20 feet) at the Basin #1 outlet. The design engineer needs to coordinate the information on the two documents. It appears that Sheet 30 needs to be revised.

Response: A. Drainage area was revised and pipes have been adjusted to accommodate additional flow; B. Sheet 30 has been revised for the pipe length and slope.

13. Acknowledged.

14. The following construction details must be added to the plans: Pavement Markings, Guard Rail, Monument, Roof Drainage Recharge Chambers, Concrete Sidewalk, Cape Cod Berm and Erosion Control Blankets. (§3.3.3.21.b)
3/21/17: The plans were revised to include a guard rail, monument, roof drainage recharge chamber, concrete sidewalk, and cape cod berm construction details. As for the monument construction detail, the monument material (concrete) and length (36") do not comply with the Subdivision Rules and Regulations. Also, per Planning Department policy, the tops of the monuments must be installed flush in grassed areas or 6" to 9" above finished grade in wooded areas. The construction detail calls for the tops of bounds being set one foot above finished grade. The "Monument" construction detail must be revised.
6/15/17: No plan revisions were made to the monument construction detail to address to this comment. The "Concrete Bound" construction detail needs to be revised to specify a granite bound with dimensions consistent with the Grafton Rules and Regulations and the policy noted above.

Response: A Granite bound detail has been added see sheet 30.

15. Acknowledged.
16. Acknowledged.
17. Acknowledged.
18. Acknowledged.

19. The plans show that Parcel C is dedicated to be an access/walkway path, with a proposed slope of approximately 25%. The slope of the access/walkway path must be revised. The pathway must have a slope equal to or less than eight (8) percent. (§4.10.4)

    3/21/17: The Engineer revised the grading for the access/walkway path to Parcel C, however the slope still exceeds eight (8) percent and proposed a 2H:1V slope at the upper end of the path. Sheet 24 shows a note requesting a waiver from the slope requirements, however this is the only reference to such a waiver request. If the Engineer wishes to request a waiver from this requirement, they should address it within the waiter request letter, and inour opinion the 2H:1V slope should be revised to be similar to the grade elsewhere on the path.
    6/15/17: No plan revisions were made to address this comment and GEI is not aware of the status of any waiver requests.

    Response: The applicant has requested a waiver from this requirement. The 2:1 slope has been adjusted to be consistent with the rest of the path.

20. The Engineer must revise the drainage pipe design to provide at least four (4) feet of cover over all drain pipes or provide Class V RCP pipe on the full length of drain lines that have less than four feet of cover anywhere along the line. Based on the plan and profile sheets, GEI estimated that the drainage pipe has less than four (4) feet of cover at the following locations: Audrina Lane Sat 4+80 to Sta 8+35; Brook Street Sta 0+05 to Sta 0+45 and Sta 16+60 to Sta 18+85; Dylan Way Sta 0+00 to Sta 2+15. (§5.4.2.2)
    3/21/17: This comment was not addressed in its entirety. The proposed drainage system has been revised, however a minimum of four (4) feet of cover was not provided over all of the drain pipes nor do the plans note that Class V RCP pipe is to be used at all of the shallow cover locations. Based on the plan and profile sheets, GEI estimated that the drainage pipe has less than four (4) feet of cover at the following locations: Brook Street Sta 17+75 to Sta 18+68; Dylan Way from CB30 to DMH7 and from CB31 to DMH7; and on the cross-country drain line from Sat 2+75 to Sta 3+84.
    6/15/17: Although the drainage pipe between DMH15 and DMH16 was revised for another reason, no plan revisions were made to address this comment. Please note that the drainage pipes between Brook Street Sta 18+35 and the headwall that discharges to the forebay have less than four feet of cover in addition to the other locations previously noted above.

    Response: The Class V note was added to all drain lines with less than four (4) feet of cover.

Hydrology & Stormwater Management Review

21. Acknowledged.
22. Acknowledged.
23. Acknowledged.
24. Acknowledged.

25. In the post-development hydrology calculations, the modeling of the infiltration basin (Pond 5P) must include the outlet pipe. The outlet control structure has three inlet orifices in parallel and out outlet pipe in series with the three orifices. As currently configured the outlet pipe appears to be more restrictive to flow than the three orifices.
    3/21/17: the hydrology calculations were not revised to address this comment. The calculations must model both this outlet pipe and the outlet pipe for Basin #2, a new basin.

6/15/17: The Rational Method calculations were revised to address the capacity of a 24" diameter outlet pipe at Basin #1, however, the capacity of the Basin #2 outlet pipe was not addressed. The capacity of the proposed 18" diameter pipe at Basin #2 is approximately two cubic feet per second less than the peak discharge during a 100-year storm event. A 24" diameter pipe needs to be proposed instead.

Response: The outlet pipe was revised to reflect a 24" diameter pipe.

26. Acknowledged.
27. Acknowledged.
28. Acknowledged.
29. Acknowledged.
30. Acknowledged.
31. Acknowledged.
32. Acknowledged.
33. Acknowledged.

34. The Engineer must provide the following calculations: rip-rap apron sizing calculations, Basin #1 drawdown time calculations, required water quality treatment volume calculations and sediment forebay sizing calculations to demonstrate compliance with MassDEP Stormwater Management Standards 1, 3 and 4.
    3/21/17: The Engineer provided rip-rap apron sizing calculations, drawdown time calculations, and sediment forebay sizing calculations (for both basins) and the diverter manhole was eliminated (stormwater flow will not bypass the treatment train). However, the flowrate used for the Basin #2's rip-rap stone size calculation is incorrect (based on the hydroCAD results) and must be revised.
    6/15/17: The rip-rap sizing calculations were not revised to address this comment.

    Response: The riprap sizing calculations were revised.

35. Acknowledged.

General Engineering Comments

36. Acknowledged.
37. Acknowledged.

38. The Engineer must match either the pipe crown elevations or 0.8 pipe diameter elevations at manholes with changes in pipe diameter (unless a drop manhole is proposed, in which case the incoming pipes would be higher). For example, pipe inverts at DMH#4, DMH #8, and DMH#12 must be revised.
    3/21/17: The Engineer has revised the drainage system, but has not matched all of the pipe crown elevations or 0.8 pipe diameters at manholes where the pipe diameters change (specifically DMH1, DMH5 and DMH15).
    6/15/17: The pipe invert elevations at DMH1 and DMH15 were adequately revised. Based upon information on Sheet 18, it appears that the pipe invert elevations at DMH5 were adequately revised, but the DMH5 information on Sheet 16 is not consistent with the information on Sheet 18; the information on the two plan sheets must be consistent. The drainage system at DMH16 was

not revised; the plans must be further revised to provide the requisite pipe elevations for drain manholes with changes in pipe diameter.

Response: The pipes and the associated elevations have been revised.

39. The location of the outlet structure must be revised. According to the Plan View Basin Detail and the hydrology calculations, the inlet opening will be below the ground surface, preventing stormwater from draining out of the basin.
3/21/17: The topography adjacent to the Basin #1 outlet control structure was revised and the inlet openings are now above the ground. However, the proposed grading is too steep up to 1H:1V). The outlet structure needs to be moved farther into the basin and the grading revised to be no steeper than 3H:1V. Likewise, the location of and grading adjacent to the Basin #2 outlet control structure needs to be revised.
6/15/17: The location of the Basin #1 outlet control structure was revised but the structure is now at a location such that the three orifices will be below the proposed ground elevation. The outlet control structure's location needs to be revised by perhaps as much as 18 feet; the lowest orifice is proposed at elevation 375.00 but the structure is located at elevation 381.4. At Basin #2, black lines that might represent two wing walls were added to the plans. The plans propose a narrow channel at elevation 370 for approximately twelve feet in length. This narrow channel needs to be avoided; the location of the outlet control structure needs to be moved farther into the basin. Lastly, the two black lines on the Basin #1 and Basin #2 outlet control structures need to be labeled or eliminated.

Response: The outlet control structures have been revised.

40. Acknowledged.
41. Acknowledged.

42. The "Catch Basin"construction detail on Sheet 27 must be revised to comply with the Town's standards. We understand that the frame must be EJIW Model No. 5520Z, the grate must be EJIW Model No. 5520MB, and the catch basin hood must be an "Eliminator".
3/21/17: The "Catch Basin" construction detail was revised as requested. However, we (previously) cited a frame and grate for a cascade inlet instead of for a square-hole inlet. The model numbers will have to be revised to specify a 5523Z frame and a 5520M5 grate.
6/15/17: The plans were not revised to address our comment of March 21, 2017.

Response: The Catch Basin Construction Detail on Sheet 31 has been revised per comment made 3/21/17.

43. Acknowledged.
44. Acknowledged.
45. Acknowledged.
46. Acknowledged.
47. Acknowledged.
48. Acknowledged.

49. The Engineer must revise the sewer and/or drain design following the reason: on Sheet 17 there is a conflict or near conflict between CB#29 and the eighteen-inch reinforced concrete drain pipe;

and on Sheet 18 there is a conflict or near conflict between CB#26 and the eight-inch polyvinyl chloride sewer pipe.
3/21/17: No sewer and/or drain design revisions were made to solve these potential conflicts.
6/15/17: The plans were not revised to address this comment.

Reponses: The structures have been moved to avoid conflicts.

50. Acknowledged.
51. Acknowledged.

52. On sheet 23, STOP and STOP AHEAD signs need to be added in accordance with the last paragraph of Greenman-Petersen Inc.'s correspondence dated September 15, 2016.
3/21/17: the "Institute Road Improvements Plan" (now Sheet 25, formerly Sheet 23) was not revised to include STOP and STOP AHEAD signs.
6/15/17: Sheet 25 was revised to show the STOP and STOP AHEAD signs but their proposed locations on the plan view still need to be shown.

Response: The location of the signs have been added to Sheet 26.

General Comments

53. Sheet 8 must be revised to include the utility easement designated for the proposed sewer pump station.
3/21/17: The utility easement for the proposed sewer pump station is shown on Sheet 8, however the bearings and distances are missing from this easement. The bearings and distances need to be included on the plans along with bounds at the easement corners.
6/15/17: The plans were not revised to address this comment.

Response: Easement has been added around sewer pump station.

54. Prior to the plan endorsement, all sheets of the plan set, including the cover sheet, must include the statement "See Sheet _____ for Planning Board Conditions of Approval", and the conditions must be inscribed on said sheet.
6/15/17: No further comment

Response: This statement will be added to the plans.

55. Acknowledged.
56. Acknowledged.

57. On Sheet 24, Note 18 references "Bellingham" and Note 21 references "Ashland". On Sheet 27 the "Precast Concrete Manhole Detail" references "M.D.P.W.". The Engineer must remove all references to Towns and DPWs other than Grafton.
3/21/17: It appears that the changes to the notes on the "Erosion Control Plan" (Sheet 27, formerly Sheet 24) were made but the text is illegible (see Additional Comments section). We will confirm the revisions when revised plans are submitted.
6/15/17: The notes on the "Erosion Control Plan" (Sheet 27) have been revised, however on Sheet 29, the "Typ. Precast Concrete Manhole Sanitary" construction detail references Ashland. The Engineer must remove all references to Towns other than Grafton.

Response: The detail on Sheet 29 has been revised to reference Grafton.

58. Acknowledged.
59. Acknowledged.

Additional Comments March 21, 2017

60. Acknowledged.

61. Sheets 11 and 13 show proposed drainage lines, catch basins, and manholes throught the wooded property to the north of Lots 17 through 23. These drainage elements are not part of the project; they appear to be left over from project design and drafting. Also, on Sheet 8, just south of the proposed sewer pump station easement and above the isolated wetlands there is a bearing and distance need to be removed from the plan set.
6/15/17: On Sheets 11 and 13, the drainage lines, catch basins and manholes previously shown have been removed. On Sheet 8, the bearing and distance that do not relate to the property line are still shown. The bearing and distance needs to be removed from Sheet 8.

Response: Sheet 8 has been revised to remove the bearing and distance.

62. The Post-Development Plan shows that the Subcatchment DA #1P discharges to a water quality swale treatment system. The Engineer must submit calculations to demonstrate that the proposed water quality swale treatment system (at the outlet pipe near the intersection of Brooke Street and Institute Road) is adequately sized to handle the required water quality volume.
6/15/17: No information was submitted to address this comment. Water quality volume calculations and any necessary supporting information needs to be submitted to demonstrate compliance with MassDEP Standard #4.

Response: Water quality volume calculations has been submitted.

63. Acknowledged.

64. The design plans show that a proprietary treatment device (Stormceptor) for TSS removal is now proposed and as such the Engineer must provide backup calculations to demonstrate that the device was adequately sized (i.e. calculations in accordance with MassDEP's "Standard Method to Convert Required Water Quality Volume to a Discharge rate for Sizing.." Also, TARP and/or MASTEP Performance Evaluation data must be submitted to support the proposed TSS removal efficiency.
6/15/17: No information was submitted to address this comment.

Response: MASTEP data has been submitted.

65. Acknowledged.
66. Acknowledged.
67. Acknowledged.

68. On Sheet 30, the labeling of Infiltration Basin #1's outlet control structure outlet pipe size is inconsistent. In two locations, the pipe is labeled as being 24-inch in diameter and in a third

location it is labeled as being 36-inch in diameter. The diameter of the outlet pipe must be consistent throughout the plans. Also, the plans label this pipe as being a PVC pipe, but RCP is required. Finally, this pipe is labeled as having a slope of 2.6% however we calculated a slope of 8% (based on invert elevations and length of pipe), which is too steep. A slope of 8% on the outlet pipe would result in an excessively high water velocity. As discussed in comment #37, the velocity must not exceed ten (10) fps. The Engineer must revise the outlet pipe as necessary.
6/15/17: The labeling of Infiltration Basin #1's discharge pipe size is still inconsistent and the pipe's slope needs to be further revised. The pipe is labeled as 24-inch under the "Pr. Outlet Control Structure" leader note but is labeled 36-inch adjacent to the pipe and under the "Pr. Headwall" leader note. The labeling of the pipe material has been revised as being a RCP. Finally the slope of the pipe has been revised to 2.6% (based upon invert elevations and pipe length) but was labeled as 2%. The pipe slope information must be consistent and the pipe slope must be such that the water velocity does not exceed ten feet per second.

Response: The pipe slope has been revised.

69. On the "Plan View Basin #2" construction detail (on Sheet 31), the invert elevations for the proposed headwall into the forebay and the DMH directly upstream of the headwall are incorrect (roughly ten feet higher than the adjacent ground elevations). The Engineer must revise these elevations.
6/15/17: The construction detail has been revised. The pipe elevations are generally in order, except that the pipe that discharges into the forebay will have a 9% slope (water velocity will exceed 10 feet per second) and the headwall needs to be relocated so that the pipe invert will be at the proposed ground elevation (as currently proposed the pipe invert will be approximately 1.5 feet below the proposed ground elevation).

Response: The construction detail has been revised.

70. Acknowledged.

71. The Engineer must provide a TSS worksheet for the water quality treatment train (Subcatchment DA #1P) which demonstrates that eighty percent TSS is removed.
6/15/17: No information was submitted to address this comment.

Response: The TSS worksheet has been submitted.

72. Acknowledged.

73. A proprietary stormwater treatment unit is proposed at the Basin #1 forebay area. This unit will require maintenance by a (heavy) vacuum truck. The treatment unit needs to be located adjacent to the roadway for ease of maintenance access.
6/15/17: The plans were not revised to address this comment. The proprietary stormwater treatment units currently proposed at Basin #1 and Basin #2 need to be relocated to be adjacent to a street for ease on maintenance.

Response: The plans have been revised to allow for maintenance access.

74. On Sheet 26, in the Phase 2 phasing narrative Lot 18 can't be released until the lot's access can be gained from a paved road. As currently proposed, road construction will occur on Brooke Street in front of this lot's driveway after the lot is released.
6/15/17: The plans were not revised to address this comment.

Response: The narrative has been revised.

Additional Comments, June 15 2017,

75. On Sheets 10 and 30, the riprap formerly shown at the inlet and outlet of the Proposed Settling Basin (at the outlet of Basin #1) was omitted on these revised plans. The plans need to be revised to show the riprap. Similarly, on Sheet 31, the riprap at the discharge point into the Basin #2 forebay needs to be extended to the base of the 3H:1V slope.

Response: The riprap has been added to Sheets 10 & 30 and has been extended on Sheet 31.

76. On Sheet 12, there needs to be a label with rim and pipe invert elevations for drop inlet DI #5B located at the property line between Lots 29 and30.

Response: Sheet 12 has been revised to add the rim & pipe invert elevations.

77. On Sheets 12 - 14, there need to be labels for pipe lengths, diameters, materials and slopes between drop inlets DI #2 and DI #6.

Response: Sheets 12, 13, & 14 have been revised to add pipe information.

78. Upon further review, on Sheet 17 the rim elevation for catch basin CB#13 is only 2.00 feet above its outlet pipe's invert elevation. There will not be enough elevation difference to accommodate the pipe's diameter and wall thickness, the thickness of the catch basin's flat-top and the height of the catch basin's frame. We calculated that the elevation difference needs to be at least 2.50 feet.

Response: Sheet 17 has been revised in regard to the invert elevation.

79. Upon further review, the locations and elevations of the catch basins proposed along intersection and radii at all four intersections need to be re-evaluated by the design engineer and revised as necessary so that they will collect stormwater. For example, at the intersection of Brooke Street and Audrina Lane, the rims (elevation 402.24 feet) of CB#9 and #10 will be approximately 0.12 feet above the Audrina Way centerline elevation at Station 8+26 (elevation 402.12 feet). Furthermore, the catch basin rim elevations will also have to accommodate the fact that the Audrina Lane cross section will be transitioning from a crown to a continuous cross slope so that Audrina Lane can tie into the gutter line of Brooke Street. Likewise, at the intersection of Brooke Street and Institute Road, CB#12 will capture runoff from Institute Road but its rim elevation (443.35 feet) is too high to capture runoff from Brooke Street (centerline elevation at station 0+00

is proposed to be 443.21 feet).

Response: The plans have been evaluate and revised as necessary to the catch basins will collect stormwater.

If there are any questions or additional comments, please feel free to contact us.

Sincerely,

Peter M. Lavoie
Project Engineer

cc: D & F Afonso Builders, Inc.